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S&T CENTER

8 April 1987
Vol. 2, No. 5

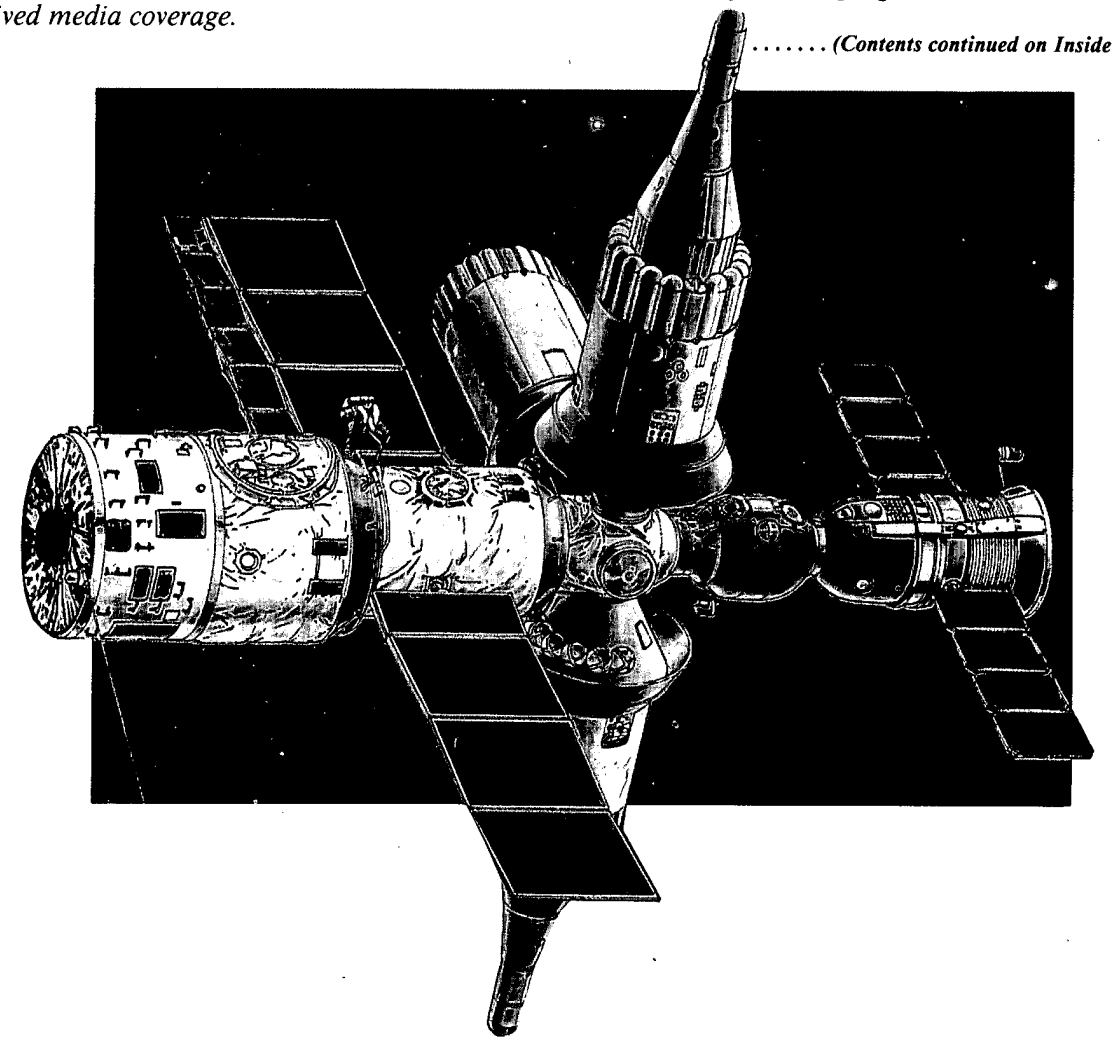
Science and Technology Perspectives

FEATURED IN THIS ISSUE:

Soviet Space Missions Planned Through the Year 2000

In contrast to past practice, the USSR is publicly discussing an ambitious array of manned and unmanned space missions—several in collaboration with West European countries—planned over the next quarter century. Since our previous status report on Soviet space programs in mid-1986, several new missions have been announced and significant new technical data has been added for those programs which have already received media coverage.

..... *(Contents continued on Inside Cover)*



French artist's conception of Soviet Mir orbital station with docked modules. The Mir will play a key role in the Soviet space program through the end of the century. (See Feature Article on page 1.)

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PERSPECTIVES selections are based solely on foreign press, books and journals, or radio and television broadcasts. Some of the materials used in this publication will appear as abstracts or translations in FBIS serial reports. Comments and queries regarding this publication may be directed to the Managing Editor (Craig M. [redacted] or to individuals at the numbers listed with items.

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SOVIET SPACE MISSIONS PLANNED THROUGH THE YEAR 2000

Recent items in the Soviet press and scientific literature, together with French press coverage of the USSR-France cooperative space program, have provided new details on Soviet space plans from the present through the end of this century. The following chronology summarizes the space mission schedule discussed in the media as of this March. In most cases, specific or approximate launch dates have been given. (For a summary of publicly announced Soviet space policy and programs as of May 1986, see the special Soviet Space Program issue of SCIENCE AND TECHNOLOGY PERSPECTIVES Vol. 1, No. 2.)

1987

ROENTGEN—This X-ray astronomy and astrophysics facility will be the first specialized module to be docked with the Mir orbital station. The observatory will carry four telescopes (one Soviet, two Dutch, and one West German) for study of X-ray radiation and three auxiliary instruments, according to a recent article in TRUD. Equipment for the module has been developed and manufactured by the USSR, Holland, England, the FRG, and the European Space Agency (ESA). An article in APN: ADVANCES OF SCIENCE AND TECHNOLOGY (5 Nov) claims that the Soviet telescope, designated "Pulsar X-1," will have detectors for hard X-rays with an effective area six times larger than that of a similar US instrument on the HEAO-3 satellite. A commentary in IZVESTIYA states that when the observatory module is docked to the Mir station it will be able to operate automatically or under control of an operator. TASS commentary after the 6 February launch of the Soyuz TM-2 indicates that the astrophysics module will be docked with Mir before the visit by a Soviet-Syrian crew in July.

SOVIET-SYRIAN MANNED MISSION—Two Syrian cosmonaut candidates began training at the Star City facility in October 1985 for a joint mission aboard the Mir. The makeup of the primary crew for the mission was announced in December 1986 and will consist of Syrian Lt.Col. Muhammad Ahmad Faris, Soviet crew commander Aleksandr Viktorenko, and flight engineer Aleksandr Aleksandrov. The joint program will include the following experiments:

- — Al-Furat (Euphrates): Study of natural resources and agricultural areas, probably concentrating on surveys of Syria.
- — Bosra: Ionospheric research using an apparatus designated "Missiya" jointly developed by the USSR and Syria.
- — Palmira and Kasyun: Studies of crystallization processes in weightlessness.
- — Anketa and Kontrast: Biomedical research experiments, the latter involving study of human visual response.

In an interview broadcast by Moscow Domestic Service on 18 December, Valeriy Ryumin, flight director for the joint mission, announced a planned launch date of "22 July at approximately 0630 in the morning."

BIOCOSMOS-87—The USSR and France have jointly developed a biological satellite to be launched in the autumn of 1987. The satellite will carry two monkeys in a 14-day flight. France is providing experiments to study effects of spaceflight at the biomolecular level and to obtain data on neuromuscular and bone metabolism. The satellite will also repeat two biological experiments, Exoblock-2 and Cytos-3, which were unsuccessful on previous missions due to equipment malfunctions.

GAMMA-1—A collaborative project of the USSR and France to build a gamma astronomy satellite. Work on the project began in 1972 and has involved scientists from the Institute of Space Research, the Moscow Engineering-Physics Institute, the Lebedev Physics Institute, the Ioffe Physicotechnical

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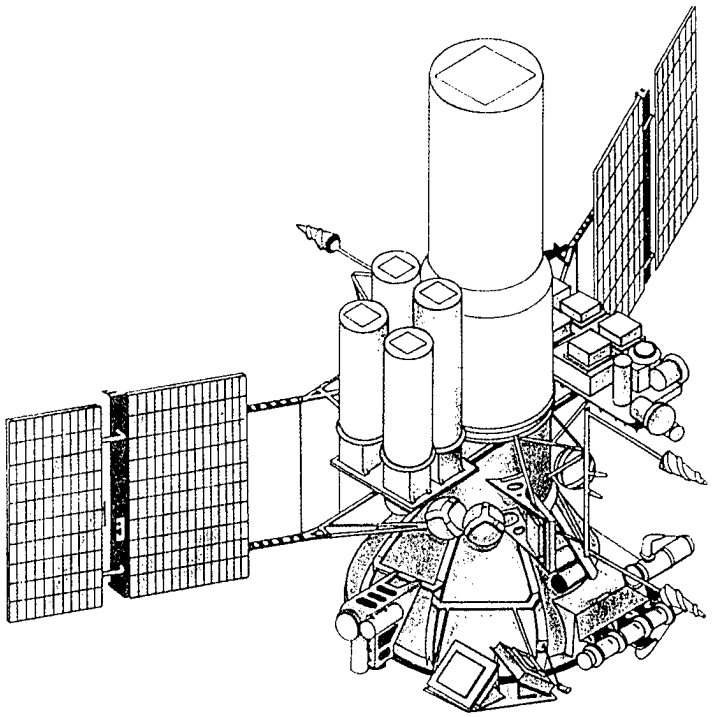
Institute, and industrial enterprises. On the French side, support has been provided by the Saclay Nuclear Research Center, the Cosmic Radiation Research Center, and the Space Research Center in Toulouse. In addition, Polish scientists at the Warsaw Polytechnical Institute have developed a television system for orientation of the telescope. The astrophysics department of the USSR Academy of Sciences' Institute of Space Research (headed by I. S. Shklovskiy) built the gamma telescope and developed the electronics for the mission.

The design of the 1,500 kilogram Gamma-1 telescope consists of 12 layers of wide-gap spark chambers with a set of Cerenkov scintillation counters and other equipment. Tests have been completed on a prototype of the telescope in a charged particle accelerator at Troitsk near Moscow, according to a report in TRUD. A recent issue of the Academy of Sciences journal ASTRONOMICHESKIY ZHURNAL claims that the use of the wide-gap spark chamber design in Gamma-1 will increase angular resolution by 2.5 times as compared with NASA's SAS-2 satellite (launched in November 1972) and the European COS-B satellite (launched in August 1975). A recent article in IZVESTIYA stated that the Gamma observatory is ready for launch; however, according to the French journal AVIATION MAGAZINE INTERNATIONAL, the launch of Gamma-1 is scheduled for December 1987.

1988

GRANAT—The purpose of this orbital observatory will be the study of X-ray and gamma sources. A specific research goal will be localization of gamma bursts, a phenomenon associated with neutron stars. TRUD reports that the scientific director of the Granat project is R. Syunyayev, head of the high-energy physics section at the Institute of Space Research. The principal instrument on the satellite will be the 1,050 kilogram French Sigma telescope (See PERSPECTIVES Vol. 1, No. 14 pp 1-2). The flight model of the Sigma telescope reportedly will be delivered to the USSR around September 1987. In addition to the Sigma telescope, the satellite will carry four smaller Soviet telescopes.

The French aerospace journal AIR & COSMOS states that the Granat satellite will be launched by a Proton booster from Baykonur during the period January-February 1988. Orbital parameters will be: apogee, 200,000 kilometers; perigee, 2,000 kilometers; period, approximately 4 days; inclination, 51



Granat spacecraft with Sigma telescope

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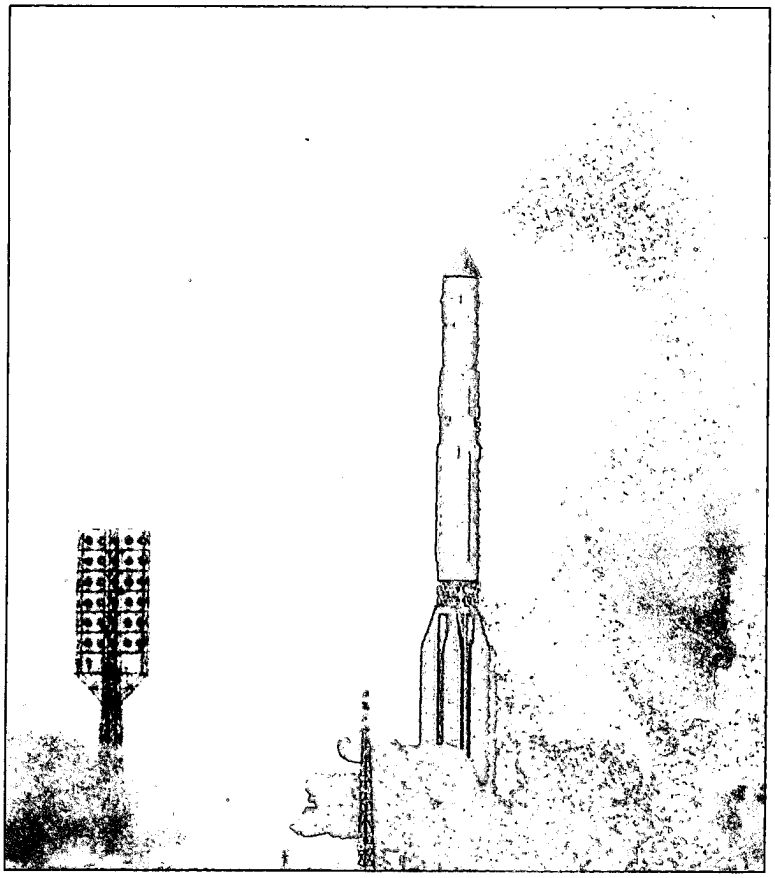
degrees. (These parameters would be identical to those used for the Astron satellite launched in March 1983.) The French journal AVIATION MAGAZINE INTERNATIONAL specifies the launch date for Granat as January 1988. Granat would thus be in orbit simultaneously with the Gamma-1 satellite. The December 1986 issue of AVIATSIYA I KOSMONAVTIKA refers to plans for operation of the Granat observatory in conjunction with the Phobos mission and an unnamed ESA spacecraft in a high elliptical orbit. The coordinated observations would reportedly make it possible to locate sources of gamma bursts with an accuracy of 10 seconds of arc.



Proton booster launch at Baykonur

USSR-FRANCE MANNED MISSION—The second flight of a French cosmonaut aboard a Soviet orbital station is scheduled for the second half of 1988. The 30-day mission to the Mir station has been designated "Aragats." French cosmonaut candidates Chretien, who participated in a 1982 Soviet-French Salyut-7 mission, and Tognini began training at Star City in November 1986. The flight program includes ten experiments, two of which will be performed during an EVA. The biomedical program includes research on the cosmonauts' central nervous system functions, hormone balance, and monitoring of bone decalcification. The technological program includes:

— ERA: Deployment of a 4-meter antenna support structure during an EVA. (For previous reporting on ERA, see PERSPECTIVES Vol. 2, No. 1 p 8.)

— Amadeus: Test of a mechanism for deployment of solar panels.

— Ercos: Study of effects of heavy ions and cosmic rays on integrated circuits and other electronic components.

— Circe: Gamma ray and neutron dosimetry of the interior of the Mir station.

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— Echantillon (Sample): Study of effects of space environment on various materials (such as paints and insulation materials) to be placed on the exterior of the station during an EVA.

The launch date for the mission is November 1988, according to the French newspaper REVOLUTION.

PHOBOS—Two spacecraft, described as the first representatives of a new generation of Soviet scientific spacecraft, are to be launched to Mars and its satellite Phobos in June or July of 1988. Total mission duration is planned for 460 days. Research packages for the mission are being developed by organizations and scientific specialists from Bulgaria, Hungary, the GDR, Poland, Czechoslovakia, France, the FRG, Austria, Sweden, Finland, Switzerland, and ESA. France reportedly will be involved in five of the active experiments:

— LIMA-D: Laser experiment for mass spectroscopy of the surface of Phobos.

— DION: Surface studies of Phobos using an ion beam. The Orleans Laboratory of Physics and Chemistry of the Environment has developed the "Aspek" instrument which will inject a stream of krypton ions onto the surface of Phobos. A mass analyzer aboard the spacecraft will measure the secondary ions produced.

— ISM: Infrared spectrometry of the surface of Mars and Phobos. The spectrometer for the experiment is being developed by France.

— Auguste: Study of the Martian atmosphere by recording spectra of solar radiation passing through the planet's atmosphere.

— Stenopee: Amplitude and frequency study of vibrations of Phobos.

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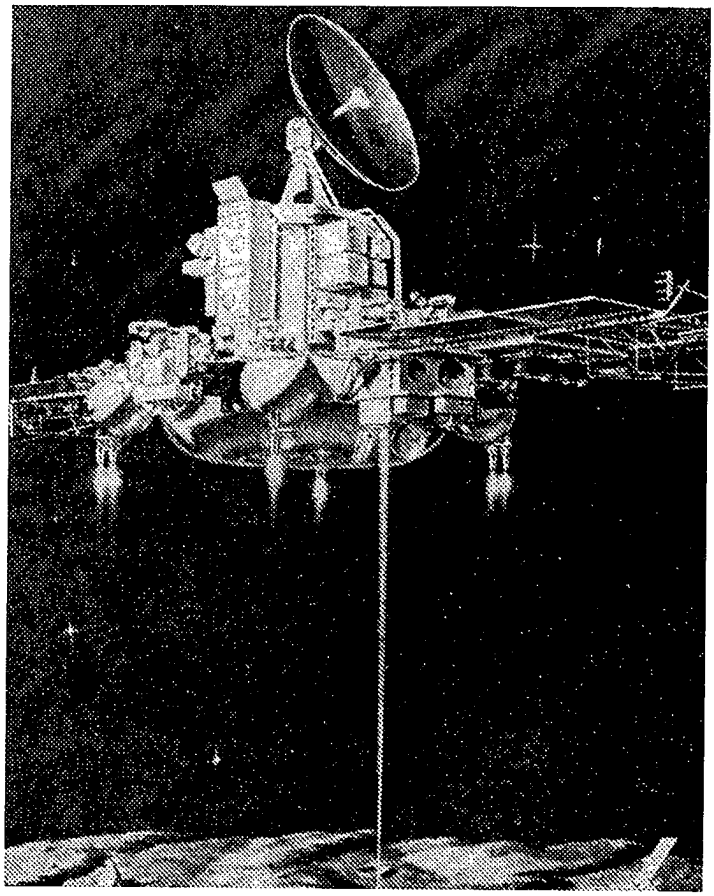
The spacecraft will also carry two French experiments designated "Lilas" and "Apex" to study high-energy gamma bursts during the flight.



Phobos spacecraft

Soviet commentaries have stated that both a long-term fixed position lander and a mobile "hopper" lander will be placed on the surface of Phobos during the flyby. An article in the journal SCIENCE IN THE USSR in mid-1986 authored by V. Balebanov and two other scientists at the Institute of Space Research stated that only one type of lander craft would be chosen for the mission (see USSR REPORT: SPACE, 16 Dec 86, p 10). However, subsequent commentaries contain references to both the fixed and mobile landers (See, for example, FBIS DAILY REPORT: SOVIET UNION, 17 Dec 86, p U2).

USSR-BULGARIA MANNED MISSION—Two Bulgarian cosmonauts began training at Star City in January of this year as the third international crew currently in training for a mission to the Mir station. One of the Bulgarian candidates will be selected for a joint mission to the Mir station to take place in 1988. According to a Bulgarian broadcast on 20 February, the launch is scheduled for the period between April and June 1988. During the ten-day flight thirty experiments will be performed, including remote sensing and materials research. If successful, this would be the first full mission flown by a Bulgarian cosmonaut. In 1979 the Soyuz-33 spacecraft with the Bulgarian cosmonaut Georgiy Ivanov aboard was forced to abort its mission when an engine malfunction made it impossible to dock with the Salyut-6 station.

COMET-3—This experiment is designed to capture comet or meteoritic dust using devices that will be placed on the Mir station in December 1988. The Comet-1 study identified dust from the passage of the Giacobini-Zinner comet; samples were returned to Earth with cosmonauts Kizim and Solovyev in

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July 1986. Comet-2 involves research to be pursued during the continuing flight of the Vega spacecraft during which attempts will be made to analyze dust from the passage of Halley's Comet.

1990

INTERBOL—This project involves the launch of two Prognoz satellites to conduct solar-terrestrial studies and survey the Earth's magnetosphere. Each satellite will have a maneuverable subsatellite. Bulgaria, Hungary, the GDR, Poland, Romania, Czechoslovakia, Cuba, France, and Sweden are reportedly taking part in this project along with the USSR. AVIATION MAGAZINE INTERNATIONAL reports that the subsatellites for the mission will be furnished by Czechoslovakia and that the launches are scheduled for February and April of 1990.

SCARAB—A scanning radiometer installed on a Meteor satellite will study the radiation balance between Earth and its atmosphere. The satellite launch is planned for 1990, according to AVIATION MAGAZINE INTERNATIONAL.

1991-92

ALISSA—This project is designed to conduct a detailed study of the upper layer of cloud systems by means of a lidar installed on a specialized module which, according to AVIATION MAGAZINE INTERNATIONAL, will be docked to the Mir in the period 1991-92.

1992-94

VESTA—Vesta is a cooperative project of the USSR and France. As originally described, the mission involved a flight to the planet Venus and the asteroid belt. As currently planned, however, it combines a Mars probe and an asteroid flyby. The USSR is developing an orbiter craft which would deploy balloon probes in the Martian atmosphere (an experiment similar to the deployment of balloon probes in the atmosphere of Venus during the Vega mission). France, in cooperation with ESA, is to produce two spacecraft for an asteroid flyby and penetrator deployment. According to AVIATION MAGAZINE INTERNATIONAL, the original schedule called for launching two spacecraft in 1994, each craft carrying a Mars orbiter and an asteroid flyby spacecraft. However, the USSR reportedly wants to change the date for launch of the Mars probes to 1992. The journal gives no reason for the schedule change, but it may be motivated, at least in part, by a desire to underscore the historical significance of the year 1992 (which will mark the 35th anniversary of the launch of Sputnik and the 75th anniversary of the Russian revolution) by launching a major new space mission. Since the French spacecraft will reportedly not be ready in time for a 1992 launch date, it may be necessary to launch the two asteroid probes on a separate spacecraft at a later date. The decision as to whether there will be a separate or combined mission will have to made in 1987.

1993-94

AELITA—This project is designed to orbit an observatory with a cryogenically cooled telescope for studies in the short millimeter and submillimeter range. TRUD quotes a statement by I. Strukov, a section head at the Institute of Space Research, in which he states that plans exist to continue research on cosmic background radiation ("relic radiation") begun with the radiotelescope carried on the Prognoz-9 satellite (launched in July 1983). According to Strukov, cooling of the radiation receiver and antenna would increase the sensitivity of the new apparatus by a factor of 3 to 4.

An article in the journal ASTRONOMICHESKIY ZHURNAL (No 5, Sep-Oct 86) reports that the telescope would have a diameter of 1 meter with a spectral range of 0.15 to 2 millimeters and a 3 to 15 minute of arc field of view. Cooling would be accomplished by a 400-kilogram supply of cryogenic agents (superfluid He^4 and liquid neon) which would provide a stable temperature of 27°K for the telescope optics. Planned operational lifetime for the mission is 1 to 1.5 years. According to AVIATION MAGAZINE INTERNATIONAL, the Aelita project is under study for launch in the period 1993-94. Several French laboratories are said to be working on the project.

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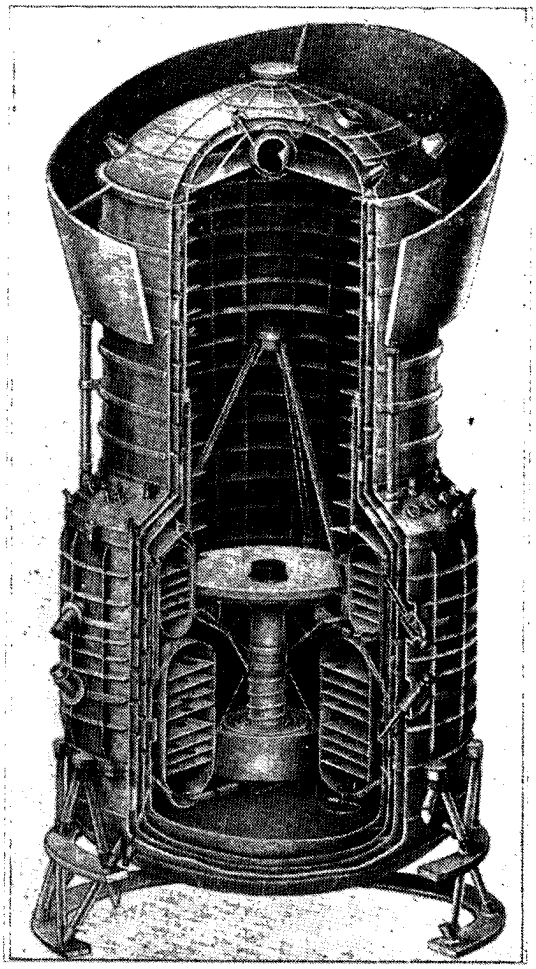

Cutaway view of Aelita telescope

1996-98

MARS SAMPLE RETURN MISSION—The French newspaper REVOLUTION stated in November that the Soviet Mars program will consist of three phases. The series, which includes the Phobos and Vesta missions (in 1988 and 1994 respectively), will culminate in the launch of probes that will land on Mars in the period 1996-98. These craft will be designed to take samples of Martian soil and return them to Earth. A Moscow radio broadcast on 31 January attributed a statement to Roald Sagdeyev, director of the Institute of Space Research, announcing a new program for exploration of Mars. Part of this new program is said to include the return of soil samples from Mars to Earth by the year 2000 (FBIS DAILY REPORT: SOVIET UNION, 10 February 87, p U3). On 18 February, Moscow World Service reported that work had begun on developing robot spacecraft to operate on the surface of Mars and that plans exist to send robots to Mars in 1996. The report cites the Institute of Space Research in Moscow to the effect that the robots will weigh about 1,500 kilograms. Landing sites would be determined based on results from the Phobos mission. A subsequent report on Moscow World Service described a project at the Academy of Sciences' Machine Engineering Institute to develop a hexapod walking rover vehicle which could ultimately be used for transporting cosmonauts on the surface of Mars.

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OTHER PROGRAMS

Two other specific programs, Radioastron and a Mir-Hermes docking, have been mentioned in recent open literature reports; however, no launch dates have been given for these projects. The Soviet media have also given wide coverage recently to the proposed establishment of a manned lunar base with a program beginning in the 1990s and culminating in the first decade of the next century.

RADIOASTRON—This is a project for a very long baseline interferometry (VLBI) complex to be composed of ground based radiotelescopes together with a radiotelescope operating in a high-apogee orbit. The antenna would be fabricated from rigid panels made of composite materials and would be automatically deployed. An article in ASTRONOMICHESKIY ZHURNAL (No 5, Sep-Oct 86) describes the Radioastron project as consisting of an orbital radiotelescope with a 10-meter-diameter antenna in an orbit with an apogee of 77,000 kilometers and a 24-hour period of revolution. A network of ground radiotelescopes, including the largest antennas in the USSR, Europe, the United States and, Australia, would operate in conjunction with the space-based telescope. Angular resolution and sensitivity of such a system would be sufficient for obtaining detailed information on radiating regions associated with black holes, neutron stars, and areas of star formation.

HERMES-MIR DOCKING—In a commentary on the twenty-second Soviet-French meeting on space cooperation held in Yerevan last October, IZVESTIYA stated that scientists are beginning to study the possibility of docking the Hermes shuttle, now under development by France for ESA, with the Mir station. The French newspaper REVOLUTION (7 Nov 86) adds, however, that before the joint mission can be conducted there is an "archaic residue of political resistance" which must be overcome.

MANNED LUNAR BASE—Discussions of scientific and economic advantages to be derived from a manned base on the surface of the Moon have recently received attention in the Soviet media. Writing in the journal VESTNIK AKADEMII NAUK SSSR (No 10, Oct 86), Doctor of Physical-Mathematical Sciences Vladislav Shevchenko presents a survey of current lunar research and proposals for lunar missions, primarily from US sources. Summaries of the Shevchenko article were carried in the Novosti publication APN: ADVANCES OF SCIENCE AND TECHNOLOGY, in the Soviet republic press, and were broadcast by TASS International Service (See FBIS DAILY REPORT: SOVIET UNION, 13 Nov 86, p U1). Shevchenko emphasizes the cost effectiveness of using lunar materials both for initial construction of a lunar base and as a source of radiation shielding for long-term manned missions in high apogee or polar Earth orbits. He maintains that creation of a manned lunar base might be possible somewhere around the year 2007 (fiftieth anniversary of the launch of Sputnik), especially if an international cooperative program were undertaken.

More recently, Shevchenko authored an article in the 29 January issue of SOTSIALISTICHESKAYA INDUSTRIYA, in which he contrasts what he calls the excessively optimistic proposals of engineers and designers two decades ago with the methodical and carefully developed programs being considered today. One such program, as outlined by Shevchenko, proposes the western region of the Oceanus Procellarum as the location for a manned base. The exact site would be determined by a new generation of automatic lunar probes that would be launched starting in the 1990s; these would be followed by robot lunar rovers which would collect necessary engineering data. The next stage would consist of a manned survey crew of four individuals and two rover vehicles. They would spend thirty days on the surface and choose the final location for the first habitation module. Construction crews and researchers would be landed after automatic craft had delivered all necessary materials to the site. Eight flights by these craft would be required to accomplish this task. The ninth flight would bring the first permanent crew to the base. This scenario seems to be a combined version of two US lunar research plans that Shevchenko described in his October VESTNIK AKADEMII NAUK SSSR article.

In contrast to Shevchenko, former cosmonaut Vitaliy Sevastyanov stated in a February SOVIET LIFE interview that the USSR is not currently pursuing a program for manned landings on the Moon:

> Manned flights to the Moon, however, are not in our plans. Why? In principle, it is not that Soviet scientists couldn't accomplish the task. We have chosen to follow a less risky but more

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effective method: Our unmanned Moon explorers have yielded as much information about the Earth's natural satellite as the American astronauts brought back with them from the Moon. The main objective of the present stage of our space program is to establish an entirely new branch of the national economy in near-Earth space. I think that this will be the focus of our program until the end of this century. Then we will probably turn our attention to Moon landings and unmanned expeditions to other planets.

John C. X2725

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REPORTS

REPORTS surveys science and technology trends as detailed in articles, books, and journals. It also includes summaries and listings of articles and books which may serve as potential sources for future research. Conference proceedings will occasionally be presented in this section.

USSR: SOVIETS TO HOST ROBOTICS EXPOSITION

Some 220 Western export firms from 14 countries will participate in the ROBOTER 87 exposition and symposium in Leningrad from 1 to 9 July. The robotics-related technology exposition is being organized in Basel, Switzerland by Sovexpo (P.O. Box CH-4002, Basel, Switzerland; phone, 061/250507; telex, 64656).

Inquiries regarding this exposition should be directed to Nate D. X2676.

ITALY: ARTIFICIAL INTELLIGENCE CONFERENCE

The Tenth Biannual International Joint Conference on Artificial Intelligence will be held in Milan from 23 to 28 August. Described by the Milan journal AUTOMAZIONE INTEGRATA (Jul 86) as "the most significant conference" on artificial intelligence, the sessions are being organized by a committee under Prof. Somalvico of the Milan Polytechnic.

Inquiries regarding this conference should be directed to Nate D. X2676.

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DEVELOPMENTS

DEVELOPMENTS highlights worldwide S&T events reported in the foreign media. Items followed by an asterisk will be published by FBIS. The contributor's name and telephone number are provided.

Aerospace

(Norway) As the European Space Agency's newest member, Norway will participate in infrared and microwave studies, advanced radar development, and satellite projects. Norway, in collaboration with the FRG, will adapt undersea life support systems and underwater manipulators for use in space. The electronics firm Norsk Data will participate in the Columbus and Hermes projects and will provide technical support for a third Kourou launch pad to accommodate the Ariane 5. (Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT 31 Dec 86)* Elli M. X2519

(France) The next Ariane launch has been postponed until May or June due to delays in the test program for the HM7B engine's third stage igniter. Tests in early January revealed problems with overheated bearings and turbopump vibration, while cold weather forced cancellation of other scheduled tests. A second test facility, opened in February at the Vernon site of the European Propellant Company (SEP), will double the testing rate and provide engine retest capability. In a related development, SEP announced plans to stay "one engine ahead" in its production schedule in order to achieve 8 or 9 Ariane launches annually. (Paris AFP SCIENCES 29 Jan 87; Paris AIR & COSMOS 7 Feb 87; Hamburg DPA 15 Feb 87) Arlene A. X2676

(France) The DGA (General Directorate for Armament) has received government authorization to begun work on the Helios and Syracuse II military satellite programs. The Helios program, conducted by the DGA and CNES (National Center for Space Studies), will provide France with military reconnaissance satellites by 1993. The Syracuse II program, managed by the DGA and the General Directorate for Telecommunication, will upgrade military communications. Designed to supercede Syracuse I transponders on the Telecom 1 satellite, the Syracuse II satellite (slated for launch in July 1991) will provide communications for ground, air, and naval units (including nuclear submarines). (Paris AFP—AGRA Data Base 22 Jan 87) Antwerp Unit/Martha W. X2617

(Spain) Construcciones Aeronauticas (CASA), Santa Barbara, and Electronica y Sistemas (INISEL) recently established a joint venture called Ibermisil for the domestic development and production of missile systems. The surface-to-air "Toledo" missile, intended to intercept low-flying aircraft, will be the firm's first development effort. Informed sources believe the firm will export the missile to the Middle East, North Africa, and Latin America. (Madrid EL PAIS 19 Jan 87) Nate D. X2676

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Agrotechnology

(Israel) A team of Weizmann Institute geneticists under Dr. Moshe Feldman has created a wheat species containing 18 to 20 percent protein and yielding 2.8 tons per acre by crossing the weak-spiked wild Triticum dicoccoides—high in protein but low-yielding—with durum and common wheats. The protein content of the new species represents a 20 to 30 percent increase over Israel's best wheat variety, without a drop in yield. (Milan BIOTEC Nov-Dec 86) Nate D. X2676

(France) The Ministry of Agriculture recently created the Biomolecular Engineering Commission to ensure consumer safety and environmental protection in the marketing of genetically manipulated organisms. The Commission's task is to evaluate requests for certification or marketing of new agricultural and food products. The commission will also serve as an oversight board for future regulatory guidelines on the uses of biotechnology in agriculture. (Paris LE MONDE 5 Feb 87) Antwerp Unit/Sharon W. X2519

Computers

(Norway) Norsk Data's new and most powerful Series 5000 computer has a performance capacity of 24 to 28 MIPS at 90 nanoseconds per instruction. Based on CMOS technology, the computer has a central unit that fits on a single circuit board and can serve 100 terminals simultaneously (with a planned 200-terminal capability). Although expensive (costing between 2 and 10 million kroner), the machine is considered to be more advanced than comparable models built by major US competitors. In addition, the new computer is compatible with existing software packages. (Oslo AFTENPOSTEN 28/30 Jan 87)* Elli M. X2519

(Japan) After comparative evaluations against Japanese supercomputers, Honda has purchased a Cray X-MP/12 for such uses as analyzing engine performance and body aerodynamics. Although the comparison revealed little difference in processing power, Honda found Cray software to be "superior." (The Honda sale represents only the seventh Cray sold to a Japanese customer. The Japanese supercomputer market continues to be dominated by Fujitsu, which has manufactured more than half of the approximately 60 supercomputers operating in Japan). (Tokyo NIHON KEIZAI SHIMBUN 30 Jan 87) Andy R. X2726

Eureka

(West Europe) Cambridge Instruments, Plasma Technology, and Slee of the UK, SGS of Italy, and Matra of France are seeking Eureka support for their project EMILY to develop a completely integrated line for the manufacture of submicron ICs using optical and electron beam lithography. Slated to run for three years, the project has an estimated cost of ECU90,000. (Paris CPE BULLETIN Jan 87; The Hague EUREKA PROJECTS Dec 86) Antwerp Unit/Sharon W. X2519

Fiber Optics

(Greece) The Greek Government will establish a facility (not further identified) for the manufacture of "high quality" fiber optic cable for domestic use and for export to the Middle East and Africa. Athens plans to invest 371 million drachmas in the project. (Athens I AVGI 30 Jan 87)* Rosa M. X2676

Machine Vision

(Italy) Machine vision research is being conducted at the University of Genoa by bioengineering, signal processing, and artificial intelligence experts who are experimenting with a single mobile camera and with stationary cameras working in tandem. The team hopes to develop a recognition system that

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converts a camera's two-dimensional image into a three-dimensional representation and that extrapolates the dimensions of objects partially hidden from view. (Milan MACCHINE Sep 86) Nate D. X2676

Microelectronics

(France) France's Study Group on Signal Processing has just announced the production of its first 2-micron CMOS chip. The group is part of the CITGV program for the development of very high speed integrated circuits (VHSICs), which includes ESD (Electronique Serge Dassault), TRT (Radio and Telephonic Telecommunications), and CSEE (Signal and Electronic Venture Company) with Thomson's Military and Space Division as producer. The signal processing chip will be used in radars, countermeasures systems, missiles, and telecommunications. The Study Group expects to sample its first 1.25-micron CMOS chips as early as this year. (For previous reporting on this subject, see SCIENCE AND TECHNOLOGY PERSPECTIVES Vol. 2 No. 1, p 10.) (Paris AIR & COSMOS 31 Jan 87)* Sharon W. X2519

Plasma Research

(Japan/India) A Toshiba-built tokamak nuclear fusion device was slated for export to India in late January. Priced at 700-800 million yen, this first tokamak to be exported by Japan will be used by the Saha Nuclear Physics Institute of India for high-temperature plasma fusion tests. Capable of generating a 75,000-amp plasma current, the doughnut-shaped device is 60 centimeters in diameter and equipped with a 16-coil toroidal magnetic circuit that can produce a 2.0-tesla field. (Tokyo NIKKEI SANGYO SHIMBUN 10 Jan 87) Mitchy E. X2726

Robotics

(Japan) Fujitsu has developed a highly sophisticated three-dimensional measurement system. Installed in a mobile robot, the measurement system can recognize multi-dimensional features by measuring the angles of line segments and determining their length with an error rate of less than 5 percent. Imaging is done by a built-in camera equipped with a fish-eye lens that reflects spherical images. The image, composed of 10,000 points, is processed in 0.8 seconds using parallel processors. Developed under the Agency of Science and Technology's "Robots for Hazardous Work" project, the system will be used in manipulators that tighten bolts in nuclear power plants. Fujitsu is also testing a prototype designed to image and handle cylindrical objects. (Tokyo NIKKEI SANGYO SHIMBUN 6 Jan 87) Akiko S. X2726

Technology Transfer

(Italy/USSR) Idra Presse of Brescia has installed in the Soviet Union two flexible manufacturing systems (FMS) for $2.3 million. The system's robots were furnished by the Able firm of Bologna. Used to manufacture diesel motors, the system is equipped with Idra Presse's 1300-ton "OR 1300 PRP" model press. (Milan MACCHINE Sep 86) Nate D. X2676

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PREVIEWS

PREVIEWS is an annotated list of selected science and technology items being translated by FBIS. The list may also contain previously published items of wide consumer interest.

EUROPE/LATIN AMERICA REPORT: SCIENCE AND TECHNOLOGY

EEC'S SPRINT PROGRAM PROMOTES INNOVATION

The SPRINT (Strategic Program for Innovation and Technology Transfer) initiative of the EEC has completed its first three-year phase and is being prepared for an additional two years (1987-88). This official publication of the EEC explains the structure and goals of the program. (Brussels EUROPEAN FILE No 18/86 Nov 86)

EUREKA CRITERIA, PROCEDURES IN NETHERLANDS EXPLAINED

Excerpt from a paper by the Netherlands Project Coordinator for EUREKA, M. van den Bergen, explaining the goals of the program and the practical steps a Netherlands firm must undertake to participate in a project. (The Hague EUREKA: MEERWAARDE VOOR EUROPESE BEDRIJVEN, date not given)

NETHERLANDS MINISTER ON EUREKA

Rudolf de Korte, Netherlands Minister of Economic Affairs, says that inter-European S&T cooperation with EUREKA is necessary to keep pace with Japan and the United States in new technologies and to speed up unification of the European market. He also explains the role and policy of European governments in EUREKA funding. (Amsterdam EUREKA BULLETIN Dec 86-Jan 87)

NEW EC-SPONSORED BIOTECHNOLOGY PROGRAMS

Article lists ten general categories for 241 contracts granted or to be granted by the EC under its Biotechnology Action Programme (BAP). (Milan BIOTEC Nov-Dec 86)

FRG PLANS INDEPENDENT NATIONAL SPACE AGENCY

The FRG's Research Ministry and Foreign Ministry are supporting a plan to establish an independent national space agency, similar to NASA, that would coordinate the FRG's space programs. This series of articles discusses the factors influencing the plan, mainly FRG dissatisfaction over its proposed role in the US space station. (Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG 10 Jan 87, 29 Feb 87; Hamburg DER SPIEGEL 12 Jan 87)

EC TO LAUNCH 'NEUROCOMPUTING' RESEARCH PROGRAM

Article announces the EC BRAIN (Basic Research in Adaptive Intelligence and Neurocomputing) project to develop a computer capable of simulating human thought processes. Due to begin in May 1987, BRAIN's initial funding totals ECU20 million between 1987-88 (Milan ITALIA OGGI 14 Feb 87)

FRG, PRC PLAN TECHNICAL INFORMATION EXCHANGE

Article details the agreement between the FRG's Karlsruhe Technical Information Center and the PRC's Beijing Institute of Scientific and Technical Information to establish a technical information exchange program. Data bases specializing in aeronautics, astronautics, physics, computer sciences, and nuclear research are planned. (Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN 29 Jan 87)

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EC-SPONSORED CAD/VLSI RESEARCH DETAILED

Article describes EC-financed R&D in the area of CAD tools and methodologies for developing VLSI. Results obtained by 28 organizations in Italy, France, and West Germany, and future lines of research are also detailed. (Turin ELETTRONICA E TELECOMMUNICAZIONI Apr 86)

PROSPECTS FOR BRAZILIAN COMPUTER TECHNOLOGY EXPORTS

This four-part special report details comparative advantages of the indigenous computer industry, government encouragement to computer exports, expected exports to the Soviet Union, and cooperation with Argentina. (Rio de Janeiro DATA NEWS 25 Nov 86)

WEST EUROPE REPORT/Military

FRENCH FIRMS EXAMINE STEALTH TECHNOLOGY FOR RAFALE

Article examines announcement by French Defense Minister Andre Giraud that the development of stealth technologies is a primary goal of the Rafale fighter aircraft program. A French consortium composed of Dassault, Snecma, and Thomson will conduct the R&D in anti-radar technologies. (Milan ITALIA OGGI 17 Feb 87)

WORLDWIDE REPORT: TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

EC TELECOMMUNICATIONS INITIATIVES OUTLINED

Article explains the Community policy on telecommunications, high-definition TV, direct television broadcasting by satellite, standardization, and videoconference/videophone technologies. (Brussels BULLETIN OF THE EUROPEAN COMMUNITIES No 6 Sep 86)

PTT MINISTER OUTLINES PRIVATIZATION STRATEGY

The Dutch PTT minister explains the PTT strategy leading to the public company's privatization in 1989. She describes the PTT's new approach to business and expects a major role to be played by the privatized PTT in telecommunications and computer standardization. (Amsterdam TELECOMMAGAZINE Jan-Feb 87)

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